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SPRUCE BUDWORM INFESTATIONS IN THE NORTHERN ROCKY MOUNTAIN REGION 1955

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SPRUCE BUDWORM INFESTATIONS IN THE NORTHERN ROCKY MOUNTAIN REGION[1/]

1955

Infestations of spruce budworm Choristoneura fumiferana (Clem.) have been common in the Northern Rocky Mountain Region for over 30 years. During the period between 1923 and 1942 the outbreaks were for the most part sporadic and short-lived; the damage to timber stands was not great. Some tree mortality occurred, however, in Douglas-fir stands in isolated instances. During 1923 an area of spruce budworm defoliation in Yellowstone National Park was followed by Douglas-fir bark beetle attacks on the weakened trees and several hundred acres of Douglas-fir timber was killed. There were other instances where trees were killed in the region, but, generally, the damage was confined to a small amount of top killing and twig deformation. All of the outbreaks that occurred during the 1923-1942 period subsided from natural causes.

Current Outbreak

The current outbreak was first observed in 1948 on the Helena, Gallatin, and Deerlodge National Forests, Montana. At that time approximately 406,000 acres were reported to be infested. In 1949 two areas of infestation were found in Idaho: one area on privately owned land south of Lewiston and one west of Riggins on the Nezperce National Forest. From 1948 until the present, the outbreak has increased in size and, with the development of new areas, it is now estimated to cover 3,100,000 acres (table 1).

The spread of the outbreak has not been without setbacks: natural control has occurred in two rather large areas and aerial spraying brought control in others. The first important decrease occurred in Montana in the South Fork of the Flathead River drainage where an outbreak developed in the Bob Marshall Wilderness Area on the Flathead National Forest in 1942. This outbreak died out from natural causes in 1951. A similar outbreak in the Swan Valley on the same forest covered nearly 75,000 acres in 1954 but, except for a few small areas, virtually disappeared in 1955.

1/ Northern Idaho, Montana, and northwestern Wyoming.

In 1952, 12,000 acres of infestation out of 81,000 in the Bitterroot Valley were treated by aerial application of insecticides. This area was reinfested in 1954 although to a lighter extent than before in 1953.

Control measures in 1955 were applied to 4 areas having a total of 372,652 acres.[2/] Because satisfactory budworm mortality was recorded in these areas following the control action the area sprayed is not included in the 1955 infested acreage reported here.

1955 Infestation

During the period of August 1 through October 4, 1955, aerial surveys were made on 8 national forests, 2 large tracts of privately owned timber and part of Yellowstone National Park (figure 1). As far as practical the intensity of the infestation was mapped by three categories: light, moderate, and heavy. Standards developed in the Pacific Northwest Forest and Range Experiment Station were followed very closely in these classifications.[3/] Where spruce budworm defoliation proved to be barely visible from the air the infestation was classed as light. Moderate infestations consisted of defoliation visible throughout the upper 1/4 of the tree crowns and heavy infestation included trees with more than 1/4 of the tree crowns defoliated. In actual practice the areas as mapped were somewhat heavier than the above classifications would indicate. (See "Survey Methods").

Ground surveys were made on all but 2 of these areas to provide supplemented data on the infestation mapped from the air.

2/ Gallatin National Forest, 77,444 acres; Yellowstone National Park, 55,412 acres; Nezperce National Forest, 70,709; Bitterroot National Forest, 169,087 acres.

3/ Wear, J. F. and Buckhorn, W. J. Organization and conduct of forest insect aerial surveys in Oregon and Washington. United States Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. March 1955. (Multilithed)

Through these aerial and ground surveys a more comprehensive understanding of the spruce budworm infestation was obtained in 1955 than for previous years. A comparison in table 2 of gross acreage of infestation on a year to year basis shows an upward trend since 1948.

(The term "gross acreage" is here used to indicate land area of defoliated timber as mapped from a reconnaissance plane or by extensive ground surveys. It includes some openings and patches of non-host timber type that would be impractical to map out by such a survey. "Net acreage" as used in control plans would equal from 60 to 100 percent of the gross acreage depending upon the nature of the timber type and terrain. Net acreage of infestation for the entire Region would equal about 90 percent of the gross acreage).

The data in table 2 show that the increase in infested acreage for the period of 1948 through 1954 has been at a fairly constant rate although there are two points of sharper increase: one in 1952 and the next in 1955. Some of the increase indicated for 1955, however, is probably due to the greater effort that was put into a more intensive survey. These surveys, both aerial and ground, searched out areas of light infestation to a somewhat greater extent than previously possible with the survey facilities then available.

With the expansion of the current spruce budworm outbreak there has also been a change in the intensity of defoliation. In areas of several years defoliation the damage has, in many instances, increased from light to moderate or from moderate to heavy. As a consequence the shift has been toward greater damage per acre of infestation (table 3).

Table 1.--Gross acreage of 1955 spruce budworm infestation by degree of damage in the Northern Region

Forest	Degree of damage			Total acreage
	Light	Moderate	Heavy	
MONTANA-WYOMING				
Beaverhead	363,856	3,046	5,990	372,892
Bitterroot	10,419			10,419
Deerlodge	266,347	138,291	85,836	490,474
Flathead	870			870
Gallatin	190,829	217,114	94,284	502,227
Helena	148,505	513,997	179,762	842,264
Lewis and Clark	155,981	233,344	19,097	408,422
B.F.P.A.[1/]	37,401	12,467	136,448	186,316
Lolo	63,130	21,632	4,454	89,216
Yellowstone National Park	5,427			5,427
Sub-total	1,242,765	1,139,891	525,871	2,908,527
IDAHO				
Lolo	742	98,893	2,278	101,913
Nezperce[2/]	6,464	75,066	8,030	89,560
Sub-total	7,206	173,959	10,308	191,473
Totals	1,249,971	1,313,850	536,179	3,100,000

1/ Blackfoot Forest Protective Association
2/ Only 79 acres on national forest

Table 2.--Gross acreage of spruce budworm infestation from 1948 through 1955 in the Northern Region and Yellowstone National Park

Year	Acres of infestation
1948	361,290
1949	406,000
1950	- - -
1951	1,166,000
1952	1,901,000
1953	2,100,700
1954	2,184,390
1955	3,100,000

Table 3.--A comparison in acreage infested and intensity of defoliation on comparable areas for 1953 and 1955

Year	Acres[1/]	Percent infested acreage		
		Light	Moderate	Heavy
1953	1,757,400	91	7	2
1955	2,994,594	41	41	18

1/ Excluded from this table were areas where control was applied to a large portion of the infested area in 1955 and areas where the data for the two years were not on a comparable basis.

Survey Methods

The objectives of the aerial phase of the spruce budworm survey in 1955 were to map areas of current defoliation to an acceptable degree of accuracy and within practical limits. Flights were restricted to areas known to have been infested in 1954 and to the adjacent timbered lands. In most instances flights were made for a distance of from 20 to 30 miles beyond the last visible infestation. In actual practice over 4 times as much acreage was flown as was found to be infested.

The terrain of much of the infested area consists of mountain valleys with valley bottoms of non-timbered agriculture or grazing land bordered by timbered slopes which in turn often terminate in barren, rocky ridges. The timber along the slopes frequently has a marginal band of lodgepole pine at lower elevations with Douglas-fir or mixed pine and fir higher on the slopes and ridges. Pure lodgepole pine stands occur intermittently, however, at almost all elevations.

Spruce budworm defoliation, except for sporadic attacks in lodgepole pine, occurs in the Douglas-fir and alpine fir types. Mapping the areas of infestation with acceptable accuracy required the mapping of all external boundaries of the infested areas. Large openings or areas of non-host timber type within the external boundaries were also mapped as "out" areas. Small openings and small areas of non-host type within the infested area were not mapped because it would have been impractical to do so. Minor irregularities along the external boundaries were also smoothed out in aerial mapping.

Frequently the infestation boundary along the lower slopes agreed closely with the edge of the timber and was therefore not too difficult to map. The "back" boundary higher up the slope was often determined by a change in type, or by the end of visible defoliation. Because both type transition and the margin of defoliation were usually both indefinite and irregular, these boundaries presented the greatest mapping difficulties.

In addition to delineating the areas of infestation, the degree of defoliation was classified according to intensity. The intensity classifications were applied in a very general way because the degree of defoliation was not very consistent. Light infestations often included timber with more defoliation than "barely visible" and moderate infestations usually had patches of heavy defoliation in them. Light conditions also varied during the day and visibility therefore changed. The change in visibility influenced the rating of light intensity infestations because infestations easily seen in the reddish morning light would often be "barely visible" in the midday light.

The infestation boundaries were plotted on half-inch-to-the-mile scale work maps and the infested area was roughly hatched in with the color designations according to the degree of defoliation: blue for light, green for moderate, and orange for heavy defoliation.

Additional notes were often added along the boundaries of plotted infestations to indicate the adjacent ground cover: non-timbered lodgepole pine, barren, Douglas-fir, etc. Such notes were of considerable help to the follow-up ground crews because it limited their work. There were also a number of instances where the aerial observer could not be sure of his observations. Such areas were marked questionable and were later ground-checked.

Copies of these aerial survey maps were passed on to two 4-man ground crews which made spot checks of the defoliated areas to verify the aerial observations. Samples were taken at intervals along roads and trails where they transected defoliated areas or along compass lines through the woods. Primarily, the ground crews investigated areas marked questionable and surveyed many marginal areas of host type to supplement the aerial mapping. Altogether, 496,552 infested acres were added to the aerially mapped acreage by the ground crews. Nearly all of this added acreage was of the light infestation category. Much of the added acreage of infestation was in large areas of broken, scattered patches of host type in rough terrain where aerial observation had detected defoliation but was unable to determine the acreage.

Copies of the finished maps were issued to the Timber Management office of the Forest Service Regional Office, which in turn sent copies back to the forests for land ownership determination of infested acreage.

During the course of the survey 12,150,000 acres were covered by aerial reconnaissance in 140½ hours of flying time and ground crews spent over 300 man days in supplementary investigations.

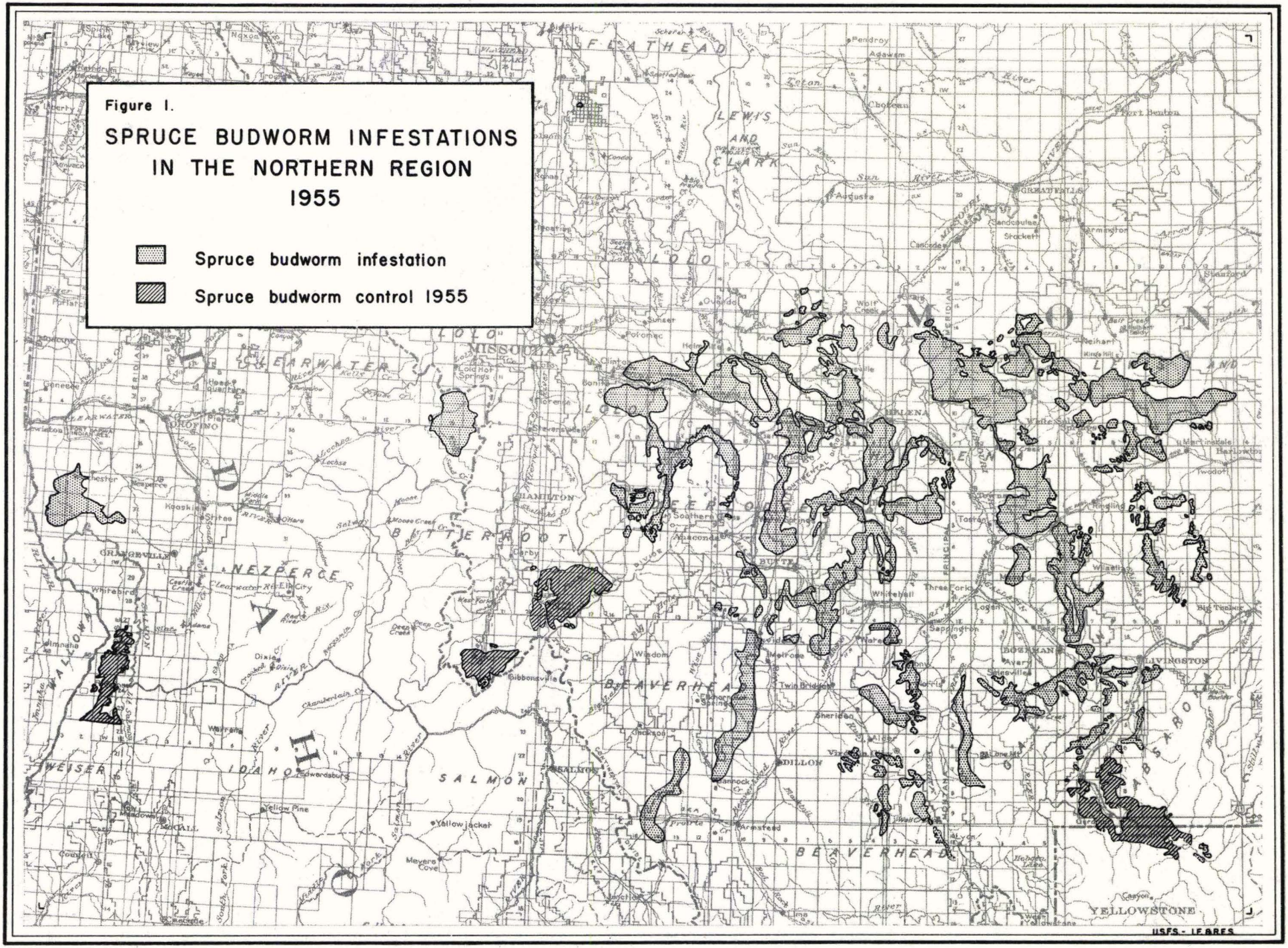
Figure 1.
SPRUCE BUDWORM INFESTATIONS
IN THE NORTHERN REGION
1955
Spruce budworm infestation
Spruce budworm control 1955
FLATHEAD
LEWIS AND CLARK
LOLO
MISSOULA
CLEARWATER
BITTERROOT
NEZPERCE
IDAHO
WEISER
SALMON
BEAVERHEAD
DILLON
BOZEMAN
LIVINGSTON
YELLOWSTONE
GREAT FALLS
HELENA
BUTTE
USFS - IFA&RES